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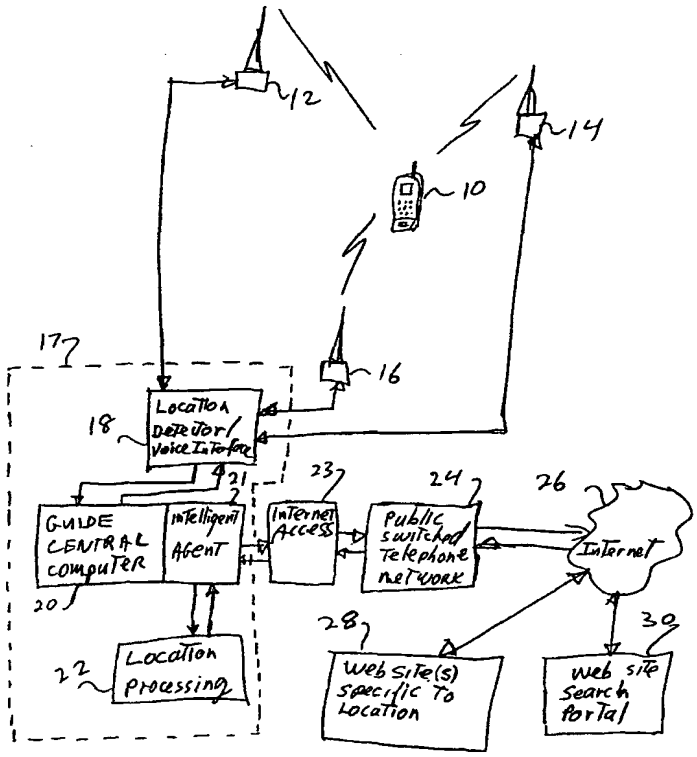

(57) Abstract: A web enabled wireless personalized and customized virtual tour-guide system includes a wireless tour-guide device and system enabled to access the Internet. The geographic location of the wireless tour-guide device is detected and reported. Intelligent agent software is responsive to a request from the user to create a customized tour program using information accessed at selected Internet web sites or a web site with pre-aggregated information. The intelligent agent uses the created tour program, such as a tour of historical exhibits, to guide the user along the customized tour route by voice and/or graphics, and provides information about each exhibit on the tour. The virtual tour-guide system can personalize each directed tour by taking individual user expressed preferences into account, and can use collaborative filtering of experiences with prior users to suggest other exhibits which may be of interest to the present user. The web enabled wireless tour-guide system is goal directed and interactive, responding like a human tour-guide to the needs of the user.

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METHOD AND APPARATUS FOR WEB ENABLED WIRELESS TOUR-GUIDE SYSTEM

Field of the invention

The present invention relates to tour-guide systems.

Background of the invention

Tour-guide systems are known. In the simplest form, a self-guided tour system may include signposts and marked walking paths. The user follows the marks that indicate the route to each exhibit and reads the signs or displays that provide information about the historical and cultural significance of each exhibit. Outdoor self guided tour systems may include walking paths formed by dots or lines of bricks imbedded in the sidewalks, or markers on trees and buildings, which lead users to points of interest. Exhibits, as used herein, can mean anything of interest to a user, ranging from a building, a machine, a work of art or an artifact, to a living thing, or just a site having historical, cultural, entertainment or educational significance.

Some exhibits, in addition to displays containing text and graphics, are known to include audio programming devices which provide speech, music and sound effects relating to the exhibit. In well-known museum systems, the user approaches the exhibit and initiates the audio programming by pressing a button. Other tour-guide systems include short-range radio transmitters that broadcast audio programming to specially adapted receivers carried by the user. In the latter wireless system, as the user approaches each exhibit, the radio receiver carried by the user (which typically includes an earphone or headset for privacy) begins to receive the broadcast related to that exhibit.

Self-guided tours with portable information devices are known. For example, art museum systems have been known to include a portable device that plays audio information about each exhibit. The user enters the number of the exhibit into the portable player, which responds by playing pre-recorded information regarding the exhibit. Such systems typically store the recorded information in a programmed memory chip.

Guided tours by audio tape recorder are also known. The user inserts the tape (or other recording medium) into the player, and follows the instructions given. The user receives information about each exhibit, and directions to find the next exhibit on the tour. The tour-guide tape may include sound effects and music in addition to spoken material to effectively recreate historical context or information of interest relating to each exhibit.

More recently, self-guided tour systems using the Global Positioning Satellite (GPS) system have been proposed. U.S. patent 5,767,795 to Shaphorst shows an electronic tour-guide system using a GPS receiver and a local data storage device, such as a CD-ROM. The GPS receiver determines the instantaneous geographic location, and the CD ROM player provides audio or video information on the history, geography, and culture associated with the geographic region including comments about a specific point of interest.

Summary of the invention

The present invention is embodied in a wireless virtual tour-guide device and system enabled to access a global communication network, such as the Internet. The tour-guide system is further embodied in a portable wireless device such as a cellular telephone or laptop computer with a cellular modem enabled to access a virtual tour-guide web site on the World Wide Web (WWW). The virtual tour-guide web site is designed as a portal for the global tourism community to access the Internet.

The geographic location of the wireless tour-guide device is detected and reported to the virtual tour-guide web site. A customized tour program, such as a historical, cultural or entertainment tour is created and made available to the user by an intelligent agent software module that then guides the user along the selected tour route.

The present virtual tour-guide system may provide a directed tour and can personalize or customize the guided tour by taking the user's individual expressed preferences into account. An intelligent agent software module, using request/response software with voice recognition and text to speech conversion, makes the present invented web enabled wireless tour-guide system a goal directed and interactive virtual tour-guide. The virtual tour-guide of the present invention is thus more like a human tour-guide than are any of the self-directed or fixed program tour-guide systems of the prior art.

Brief description of the drawings

Figure 1 is a block diagram of a first embodiment of a web enabled wireless tour-guide system in accordance with the present invention.

Figure 2 is a flow chart diagram illustrating the operation of the wireless tour-guide system of figure 1.

Figure 3 is a block diagram of a second embodiment of a web enabled wireless tour-guide system in accordance with the present invention.

Figure 4 is flow chart diagram illustrating the operation of the system of the virtual tour-guide web site of figure 3.

Figure 5A is a diagram of the data format of an exhibit, which is part of a downloaded local tour database.

Figure 5B is a diagram of the data structure illustrating an inventory of tours.

Detailed description

A wireless virtual tour-guide system in combination with a cellular telephone system is shown in figure 1. As described herein, a "user" can be a tourist, traveler, visitor, sightseer, vacationer, employee traveling on business, or any person or group of persons taking a trip with visits to places of interest for business, pleasure or instruction. The cellular telephone system in figure 1 includes a plurality of communication towers 12, 14, 16 within range of a wireless cellular handset 10. The cellular central station 17 comprises a location detector/voice interface 18, location processing 22, and a guide central computer 20 with intelligent agent software 21. The tour-guide system further includes Internet access capability 23 through the public switched telephone network 24 to reach web sites 28, 30.

The cellular central station 17 has the capability to determine the geographic location of the handset 10, as well as the identity of the user (by using caller ID features, for example). The raw data representing location of the handset may be determined using either relative time of arrival of the signal from handset 10 at the multiple communication towers 12, 14, 16, or by signal sensing directional receiving antennas, or any other means. The raw location data (time of arrival, direction and the like) is converted to useful form by location processing 22. The raw location data is converted to universal coordinates (latitude, longitude and altitude). If

necessary, the location data is further converted to human recognizable form, such as names, street addresses and familiar landmarks.

The flow chart of figure 2 illustrates the operation of the system of figure 1. In operation, a user initiates 40 a cellular phone call to the guide central computer. The user then enters, at the handset, a request 42 for a guided tour. The request 42 can be a natural voice request or a push button request on the keypad of the cellular phone handset. The cellular phone also reports data relating to the location of the handset to the cellular central station at step 46.

At the cellular central station (17 in figure 1), the intelligent agent software within the guide central computer 48 may initiate access to the World Wide Web on the Internet at step 50. Location processing (22 in figure 1) determines the universal coordinates and/or the geographic location of the handset, and forwards the handset location to the intelligent agent software. In response, the intelligent agent software accesses a specialized web search portal at step 50.

Based on determined location for the user's handset, the web search portal redirects 52 the intelligent agent software to connect to a web site (or to plural web sites) specific to the cellular phone location and/or user requests at step 54.

In particular, the specialized search portal (30 in figure 1) finds those web sites relevant to the user's location or user's requests by searching the database of tour-guide web sites at the web site search portal 30. The database of tour-guide web sites may be obtained by prior registration by individual web site(s) (28 in figure 1) at web site search portal (30 in figure 1), or from specially aggregated tour site information. For many user locales there may be only one relevant web site. However, in other locales, such as large urban centers, there may be several relevant web sites. The search results that are provided 52 by the web site search portal permit the guide central computer 48 and intelligent agent 58 to connect 50 to one or more of the URLs 54 most appropriate to the handset location.

Intelligent Agent Tour-Guide

Using the web site specific to the location of the handset as an information source, the intelligent agent software downloads 54 selected local tour-guide information to the guide central computer. Tour-guide information may include names and locations of local exhibits, along with text, graphics and audio related to such local exhibits. The intelligent agent software assembles or constructs one or more suggested guided tours for the user at

step 56. As an alternative to creating a tour from scratch (a fully customized tour), the intelligent agent software may select from an inventory of canned tours, or modify a canned tour to create a new semi-customized tour. The intelligent agent asks the user, for example, "What kinds of places would you like to visit?" Or "would you like me to guide you on a tour of historical sites in the city?"

In its simplest form, the suggested tour is a fixed itinerary. Th intelligent agent 58, via the voice interface text to speech conversion 60, instructs the user by voice response 44 to proceed to the nearest exhibit on the fixed tour. When the location detector indicates that the user is near the first exhibit, prepared information about the first exhibit is played (or offered to be played). If the information is of a preliminary nature and there is more information available about the exhibit, the intelligent agent may ask 44, "Would you like to know more?" The user may respond 43 by speaking a voice response into the microphone on the handset. The voice recognition interface (18 in figure 1) translates received speech response into a digital representation at step 60 for input to the intelligent agent 58 (21 in figure 1).

Depending on the user's response, the intelligent agent provides more detailed information regarding the first exhibit. Then the intelligent agent directs the user to the next (typically nearest) exhibit on the tour. If the user responded "no" to the last request above, the intelligent agent might ask, "Would you like to continue to the next destination?" If "yes", the intelligent agent presents directions to the next exhibit on the fixed tour, and so forth. In the preferred embodiment, the intelligent agent uses speech to provide directions, however the intelligent agent may provide directions to an exhibit using text and/or graphics as well.

The user can cut short a description in progress of the current exhibit by an expression indicating no further interest in the current exhibit. In such case, the intelligent agent may suggest moving on to the exhibit on th tour. As indicated below in the discussion of revenue models and advertising, the intelligent agent may also direct the user to restaurants, lodging, stores, movies, shows, souvenir shops, beauty parlors, drug stores, gift shops and the like along the tour route. The intelligent agent may also provide topological information or describe other natural features along the tour route.

The user can customize the tour in progress (as well as the initial tour) by expressing special interests and indicating areas of interest and non-interest (examples of user preferences). The universe of requests and responses for users in a given locale is anticipated and programmed into the

intelligent agent software. Collaborative filtering may be used to suggest other exhibits that previous users visited that might be of interest to the user. In such manner, the intelligent agent "learns" from the requests and responses of all visitors, so that the virtual tour-guide becomes more knowledgeable with experience. Furthermore, the intelligent agent "learns" from past experience with the preferences of a particular user as to which types of exhibits that most interest that particular user.

Tour-Guide Data Format: Exhibits

The data format for each exhibit in the downloaded local tour database is shown in figure 5A. A data record 150 which includes an exhibit name 152, exhibit type 154 and exhibit location 156, 158 represents each exhibit in the locale visited by the user. Exhibit type 154 is a numeric representation characterizing the type of exhibit (i.e., art museum, historic landmark, souvenir shop, topological feature, etc.).

Exhibit location is recorded in universal coordinate form (latitude, longitude and altitude) 156, human readable form (address and street name) 158 or by other methods of indicating location. The data record 150 may also include exhibit location recorded in raw data form to simplify location processing elsewhere in the system. That is, if the exhibit location is available in raw data form, location processing (22 in figure 1) to determine universal coordinates and/or street names may be simplified or eliminated. To the user, exhibit location in human understandable form is a meaningful response to the common traveler inquiry, "Where am I?"

In addition to the point location of an exhibit, the exhibit location field 156 contains a region or area location in which the user may view the exhibit. For example, a mural on the outside of a building may only be viewed while the user is standing in a region outside the building near the mural. At the same site, a painting inside the same building may only be viewed while the user is standing in a region near the painting inside the building. For this reason, the exhibit location field 156 also includes the viewing region for each exhibit in addition to the center point location.

The data record for each exhibit further contains an approximate estimate of time spent (dwell time) at that exhibit by a typical user. The typical dwell time information is used together with the typical travel time between exhibits to calculate an estimated total tour time. The experience of prior users is collected in a collaborative filtering process to estimate such typical dwell times and travel times.

The exhibit data record 150 contains one or more descriptive texts with accompanying audio and graphics 160, 161 related to the exhibit. For a simple exhibit, there may be a single description 160. For a more complex exhibit, there may typically be an introductory description 160 that is followed by one or more additional detailed descriptions 161, which are linked together in a logical order and called up as needed based on requests from the user for further information.

Tour-Guide Data Format: Tour Format

A tour consists of an ordered list of exhibits. A tour can be a prearranged list of exhibits, i.e., a fixed itinerary referred to as a "canned tour." A tour can also be assembled by the intelligent agent tour-guide software, which creates the ordered list based on expressed preferences of the user. The downloaded database typically may include a collection of "canned" tours. For example, there may be a "one hour art museum tour", a "three hour battlefield tour", an "all day tour of the city landmarks," and the like.

Figure 5B illustrates examples of a tour inventory 162 of canned tours 164, 166. A first tour 164 includes exhibit 71, followed by exhibit 18, then exhibit 95 continuing along the tour to exhibit 29. Typically, a tour is a closed path ending where it began. Thus, exhibit 29 may be near to exhibit 71. In such manner, the tour may be started at any exhibit and continued in either direction through all the remaining exhibits. A second tour 166 includes exhibit 42, followed by exhibit 21 continuing through the tour to exhibit 7. The second tour 166 has fewer exhibits as compared to the first tour 164, and is generally a shorter tour. However, beyond the number of exhibits, the length of a tour is related to the amount of time spent at each exhibit, the amount of information requested from the intelligent agent, the intelligent agent responses and the time required to move from one exhibit to the next. Each of the canned tours 164, 166 may include a stored representation of the estimated total time required for each such tour.

An initial task of the intelligent agent virtual tour-guide is to match one of the canned tours 164, 166 to the preferences of the user. In addition, the intelligent agent virtual tour-guide selects a beginning point for the selected tour, typically at the exhibit closest to current location of the user.

If none of the canned tours 164, 166 is suitable to match the preferences of the user, the intelligent agent virtual tour-guide may construct an original tour from the exhibit records (150 in figure 5A) in the downloaded local database. For example, to suit a user's preferences, a tour can be

specifically selected from a variety of exhibit types in which the user expressed an interest.

As another example, if the user indicates that only a short amount of time is available for a tour, the intelligent agent software selects fewer exhibits, and/or selects exhibits that are closer together. One way to create a short tour is to remove exhibits from a longer canned tour so that the total time required for the modified canned tour matches the time available to the user. In the alternative, the intelligent agent software may ask the user to indicate preferences and priorities of each exhibit in a long tour, in order to allocate the available time for a short tour. The tour exhibits may also be reordered according to the priority of expressed user preferences rather than the shortest route.

Alternate Embodiments

A wireless virtual tour-guide system is embodied in combination with a wireless data system as shown in the alternate embodiment of figure 3. A portable computer 70, or other mobile device, for use in the wireless data system, has a screen display 75, a keyboard 73, a microphone 74, a speaker 72 and a two-way digital data radio 87. The portable computer 70 further includes a GPS receiver module 77 or other method for determining the geographic location of the user. GPS receiver module 77 may be either a plug in PCMCIA peripheral as shown, or alternatively be built into the portable computer 70. Any type of portable computer or mobile device may be used, such as a laptop, a palmtop or a personal digital assistant (PDA). Since the preferred human interface in the present system is via natural voice request and voice response processing, and portability is very attractive to a typical user, a small pocket device with minimal screen functions is desirable.

An alternative embodiment to either a GPS location module or antenna triangulation is to present a map to the user on the display and have the user request or indicate his location by clicking on the map. Such feature would permit the user to receive a tour in any locale without a GPS receiver or triangulation system, so long as the user provides periodic location updates to the intelligent agent. The self-location feature would also permit the user to take a web based virtual tour in any country or city by clicking on a desired location on a corresponding map. Such trial virtual tour using a web enabled virtual tour-guide permits the traveler to explore the exhibits at a destination before actual arrival. Virtual tours are available from any user location by visiting the virtual tour-guide web site (84 in figure 3) on the Internet. The user may enter his actual or virtual

location by voice, graphics or keyboard.

There are two types of location information of significance in the present invented web enabled wireless tour-guide system. First, the user specifies a general first location for the tour. The tour guide web site then constructs a tour of exhibits in the vicinity of the supplied first location. Second, while on the tour, the user supplies second location information as to the user's location on the tour. The tour guide web site provides descriptions of the individual exhibit based on when the user is near an exhibit. For a virtual tour, the second location(s) are not real. For an actual tour, the second location(s) are the actual physical location(s) of the user. In either type of guided tour, the first location may be either virtual or actual. A user may request a tour either before or after arrival at the desired destination.

The wireless data system of figure 3 further comprises a plurality of communication towers 81, 83, 85 within range of the portable computer 70. The air interface between the digital data radio 87 and the central station 79 can be any suitable transmission scheme. The preferred application communications protocol is standard TCP/IP for connecting to the Internet. Other suitable data protocols include WAP (wireless application protocol) and VXML (voice extensible markup language). The central station 79 includes a digital data receiver 76 and a central office computer 78 and broadband Internet access 80 for connection to the Internet 82. The primary function of the central station 79 and the wireless data system 81, 83, 85 is to perform the functions of an Internet Service Provider (ISP) with respect to the portable computer 70.

Elsewhere connected to the Internet is a virtual tour-guide web site 84. The virtual tour-guide web site 84 may include a voice over IP interface 86, a natural language processor 88, an intelligent agent tour-guide 90 and a database of historical, cultural and entertainment information 92.

The operation of the system of figure 3 is illustrated in the flow chart of figure 4. In operation, a wireless portable computer with an Internet browser 100 establishes a connection 104 over the Internet to a virtual tour-guide web site 116 (84 in figure 3). In such manner, a portable computer 70 running a standard Internet browser program such as Netscape Navigator or Microsoft Internet Explorer, is able to receive tour-guide services under the present web enabled wireless virtual tour-guide system by connecting to the virtual tour-guide web site 116.

The portable computer translates 102 voice commands using voice recognition or other software, into voice over IP format, and processes received text to

speech 106 as well as VXML commands into audio. Also, the portable computer reports 101 its location over the TCP/IP connection 104.

At the virtual tour-guide web site 116, the user identity and location is received 108. Standard browser cookies are used to identify previous visitors to the virtual tour-guide web site 116, without requiring a specific user identity (e.g., without an actual name). If the user has previously visited the virtual tour-guide web site 116 (determined from the cookie), the user preferences are retrieved at step 110. If the user is a first time web site user (determined by the lack of a cookie), a preferences file for the new user is established at step 110. Alternatively, the new user may prefer to register at the virtual tour-guide web site 116 and communicate the user's personal preferences.

The virtual tour-guide web site 116 receives and processes user requests and responses at step 114, which requests/responses may be by voice input or by keyboard input. In response to user requests, a local tour is constructed or selected at step 112. A series of questions, instructions and responses are generated at step 113 in connection with the generated tour at step 112. The intelligent agent (software layer 90 in figure 3) carries out step 112 (generation of a local tour), as well as interfaces with interpretation step 113 (in conjunction with the natural language processing layer 88 in figure 3). The intelligent agent may operate in English or in any other language. For each other language of interest, exhibit formats are translated into such other language, and corresponding voice recognition and text to speech software for each such language are used.

Hybrid Approaches

A key difference between the embodiments of figures 1 and 3 is that figure 1 shows plural web sites 28, 30 to provide tour-guide services, while figure 3 shows one web site 84 to provide tour-guide services. In the first embodiment, the vast resources of the Internet are made available to the user. In the second embodiment the entire database of historical, cultural and entertainment information is aggregated and stored in one main virtual tour-guide web site.

A hybrid of the above two approaches provides a logical way to deploy a web enabled virtual tour-guide system, which also provides a migration path for continued growth. Beginning with a single web site provides the opportunity to establish uniform data format standards for exhibits and tours used by the intelligent agent virtual tour-guide software.

An initial database limited to the most popular exhibits and tours for a

single city, for instance, is easily accommodated on a single web site. Later, additional web sites (28 in figure 1) for other cities or lesser-known exhibits in the same city may be added to the network by linking to such additional web sites from the main web site. Thus, in the hybrid approach, web site search portal 30 in figure 1 would also include the functions of virtual tour-guide web site 116 in figure 4 (84 in figure 3). In such case, the function of the intelligent agent is performed at the virtual tour-guide web site (as in figure 3) rather than the cellular central station (as in figure 1). Large server farms on the Internet store all tour information, thereby requiring little or no memory in the mobile device (70 in figure 3), and putting less demand on the mobile device batteries.

Linking to plural web sites (28 in figure 1) from the main web site (30 in figure 1) also permits the intelligent agent virtual tour-guide software to assemble a guided tour drawn from more than one web site information source. For example, a first web site may contain information on art museums in a city, while a second web site may contain information on famous architectural sites in that city. To construct a guided tour in that city of both Victorian art and Victorian architecture, for instance, the intelligent agent software accesses both first and second web sites to construct the requested guided tour.

Another difference between the embodiments of figures 1 and 3, is that figure 1 shows a cellular telephone system as an intermediary adapted to receive audio and graphics content derived from the Internet and deliver the content to a telephone handset. The system of figure 3 shows a personal computer having direct and full digital Internet access. Providing a laptop computer with a cellular modem in figure 1 to replace the handset 10 creates a hybrid of the two approaches. In such case, by replacing handset 10 with a laptop and modem, the direct Internet access architecture of figure 3 could be used in figure 1.

Revenue Models

Revenue to support the web enabled tour-guide system may be derived by levying tour fees, subscriber fees, advertising fees or licensing fees. The present system includes features that permit any revenue model or a combination of revenue models to be used. In the tour fee model, a fee may be charged to a credit card before the guided tour is delivered. The fee may be either a flat fee per tour, a fee proportional to the length of the tour or the amount of data delivered during the tour. Charging by the amount of data delivered permits revenue sharing among various owners of copyrighted tour materials used in the tour.

Advertising may be included in the tour via the intelligent agent software. Users are given a list of nearby restaurants when the user asks, for example, "Where can we eat?" or says, "We're hungry." The intelligent agent can suggest a restaurant stop at certain points in a tour, for example. Other types of businesses of interest to users include lodging, travel and car rental agencies, clothing stores, movies, theatres, sporting events, souvenir shops, beauty parlors, drug stores, gift shops and the like. In each case, the intelligent agent is responsive to key words in a user's inquiry to look up in its advertiser database the closest business or businesses which correspond to the user inquiry. The known geographic location of the user is taken into account in selecting the closest recommendations. Advertising revenue may be based on subscription, i.e., the amount of time a business is listed in the database such as a predetermined cost per month. In the alternative, advertising revenue may be based on the number of times a referral to such business is provided to the user, i.e., at a predetermined cost per play.

What is claimed is:

1. In a wireless communication system for providing a guided tour for a user, said system including a central station, a plurality of communication towers and a user handset, said central station communicating with said handset over said plurality of communication towers, said method comprising:

receiving a request for a guided tour from said user handset;

determining the location of said user handset to provide a detected user location;

selecting said guided tour based on said detected user location, said guided tour containing a plurality of exhibits in the vicinity of said detected user location;

providing directions to said user to enable said user to travel to a given exhibit of said plurality of exhibits; and

providing a description of said given exhibit to said user when said detected user location indicates that said user is near said given exhibit.

2. A method in accordance with claim 1, wherein said central station further communicates with a first Web site and wherein said step of selecting said guided tour based on said detected user location includes selecting a tour from a database of tour exhibits stored at said first Web site.

3. A method in accordance with claim 1, wherein said central station further communicates with a first web site which redirects said central station to a second Web site, and wherein said step of selecting a guided tour based on said detected user location includes selecting said guided tour from a database of tour exhibits stored at said second Web site.

4. A method in accordance with claim 1, wherein said central station further communicates with a first web site which redirects said central station to a second Web site, and wherein said step of selecting a guided tour based on said first location includes selecting a tour from a first database of tour exhibits stored at said first Web site and a second database of tour exhibits stored at said second Web site.

5. A method in accordance with claim 1, wherein said central station further communicates with a first web site which redirects said central station to second and third Web sites, and wherein said step of selecting a guided tour based on said first location includes selecting a tour from a first database

of tour exhibits stored at said second Web site and a second database of tour exhibits stored at said third Web site.

6. A system method in accordance with claim 1, wherein said step of determining the location of said user handset to provide a detected user location comprises using a Global Positioning Satellite receiver.

7 A system method in accordance with claim 1, wherein said step of determining the location of said user handset to provide a detected user location comprises using signal triangulation of a signal from said user location received at said plurality of communication towers.

8. A system method in accordance with claim 1, wherein said step of determining the location of said user handset to provide a detected user location comprises said user providing an indication of the location of said user.

9. In a system for providing a guided tour for a user, said system including first and second Web sites and said user being remote from said first and second Web sites, a method comprising:

receiving a request for said guided tour at said first Web site from said user;

receiving first location information from said user, said first location representing the general locale of said guided tour;

selecting a second Web site based on said first location, said second Web site containing information related to exhibits in the vicinity of said first location;

selecting a guided tour at said second Web site based on said first location, said guided tour containing a plurality of exhibits in the vicinity of said first location;

providing directions to said user to enable said user to travel to a given exhibit of said plurality of exhibits;

determining a second location of said user to provide a detected user location; and

providing a description of said given exhibit to said user when said detected user location indicates that said user is near said given exhibit.

10. A method in accordance with claim 9, wherein said first Web site is a search portal containing a database of Web sites related to said first location.

11. A method in accordance with claim 9, wherein said first Web site further includes a database of exhibits relating to said first location, and said step of selecting a guided tour includes selecting a guided tour containing a plurality of exhibits in the vicinity of said first location from said first and second Web sites.

12. A system method in accordance with claim 9, wherein said step of determining said second location of said user to provide a detected user location comprises using a Global Positioning Satellite receiver.

13 A system method in accordance with claim 9, wherein said step of determining said second location of said user to provide a detected user location comprises using signal triangulation of a signal from said user location received at said plurality of communication towers.

14. A system method in accordance with claim 9, wherein said step of determining said second location of said user to provide a detected user location comprises said user providing an indication of the location of said user.

15. In a system for providing a guided tour for a user, said system including a first Web site containing a programmed digital computer and said user being remote from said first Web site, a method at said Web site comprising:

receiving at said first Web site a request from said user for a guided tour;

determining a first location from said user, said first location representing the general locale of said guided tour;

selecting said guided tour based on said first location, said guided tour containing a plurality of exhibits in the vicinity of said first location;

providing directions to said user to enable said user to travel to a given exhibit of said plurality of exhibits;

determining a second location of said user to provide a detected user location; and

providing a description of said given exhibit to said user when said

detected user location indicates that said user is near said given exhibit.

16. A method in accordance with claim 15, wherein said step of selecting said guided tour based on said first location includes selecting a tour from a database of tour exhibits stored at said first Web site.

17. A method in accordance with claim 15, wherein said system for providing a guided tour for a user further comprises a second Web site, and wherein said step of selecting a guided tour based on said first location includes selecting said guided tour from a database of tour exhibits stored at said second Web site.

18. A method in accordance with claim 15, wherein said system for providing a guided tour for a user further comprises a second Web site, and wherein said step of selecting a guided tour based on said first location includes selecting a tour from a first database of tour exhibits stored at said first Web site and a second database of tour exhibits stored at said second Web site.

19. A method in accordance with claim 15, wherein said system for providing a guided tour for a user further comprises a second Web site and a third Web site, and wherein said step of selecting a guided tour based on said first location includes selecting a tour from a database of tour exhibits stored at said second Web site and a database of tour exhibits at said third Web site.

20. A system method for providing a guided tour for a user, said method comprising:

requesting said guided tour;

determining a first location from said user, said first location representing the general locale of said guided tour;

selecting said guided tour based on said first location, said guided tour containing a plurality of exhibits in the vicinity of said first location;

providing directions to said user to enable said user to travel to a given exhibit of said plurality of exhibits;

determining a second location of said user to provide a detected user location; and

providing a description of said given exhibit to said user when said

detected user location indicates that said user is near said given exhibit.

21. A system method in accordance with claim 20, wherein said step of selecting a guided tour based on said first location comprises:

selecting a plurality of exhibits from an inventory of exhibits in the vicinity of said first location to form a selected plurality of exhibits; and

listing said selected plurality of exhibits in an ordered list to form said guided tour containing said selected plurality of exhibits.

22. A system method in accordance with claim 20, wherein said step of selecting a guided tour based on said first location comprises:

selecting a predetermined tour from an inventory of predetermined tours related to said first location and based on a preference of said user, each of said predetermined tours comprising an ordered list of a respective plurality of exhibits.

23. A system method in accordance with claim 20, wherein said step of selecting a guided tour based on said first location comprises:

selecting a predetermined tour from an inventory of predetermined tours related to said first location, each of said predetermined tours comprising an ordered list of a respective plurality of exhibits; and

modifying said predetermined tour based on a preference of said user.

24. A system method in accordance with claim 23, wherein said step of modifying said predetermined tour based on a preference of said user comprises deleting an exhibit from said predetermined tour.

25. A system method in accordance with claim 23, wherein said step of modifying said predetermined tour based on a preference of said user comprises adding an exhibit to said predetermined tour.

26. A system method in accordance with claim 20, wherein said step of determining a second location of said user to provide a detected user location comprises using a Global Positioning Satellite receiver.

27. A system method in accordance with claim 20, wherein said step of determining a second location of said user to provide a detected user location comprises using signal triangulation of a signal from said user

location received at a plurality of receiving antennas.

28. A system method in accordance with claim 20, wherein said step of determining a second location of said user to provide a detected user location comprises said user providing an indication of the location of said user.

29. A system method in accordance with claim 21, wherein said ordered list of said selected plurality of exhibits is in the order of the shortest tour containing said selected plurality of exhibits.

30. A system method in accordance with claim 21, wherein said ordered list of said selected plurality of exhibits is in the order of the priority preferred by said user containing said selected plurality of exhibits.

31. A system method in accordance with claim 29, wherein said given exhibit is the nearest exhibit to said user on said guided tour.

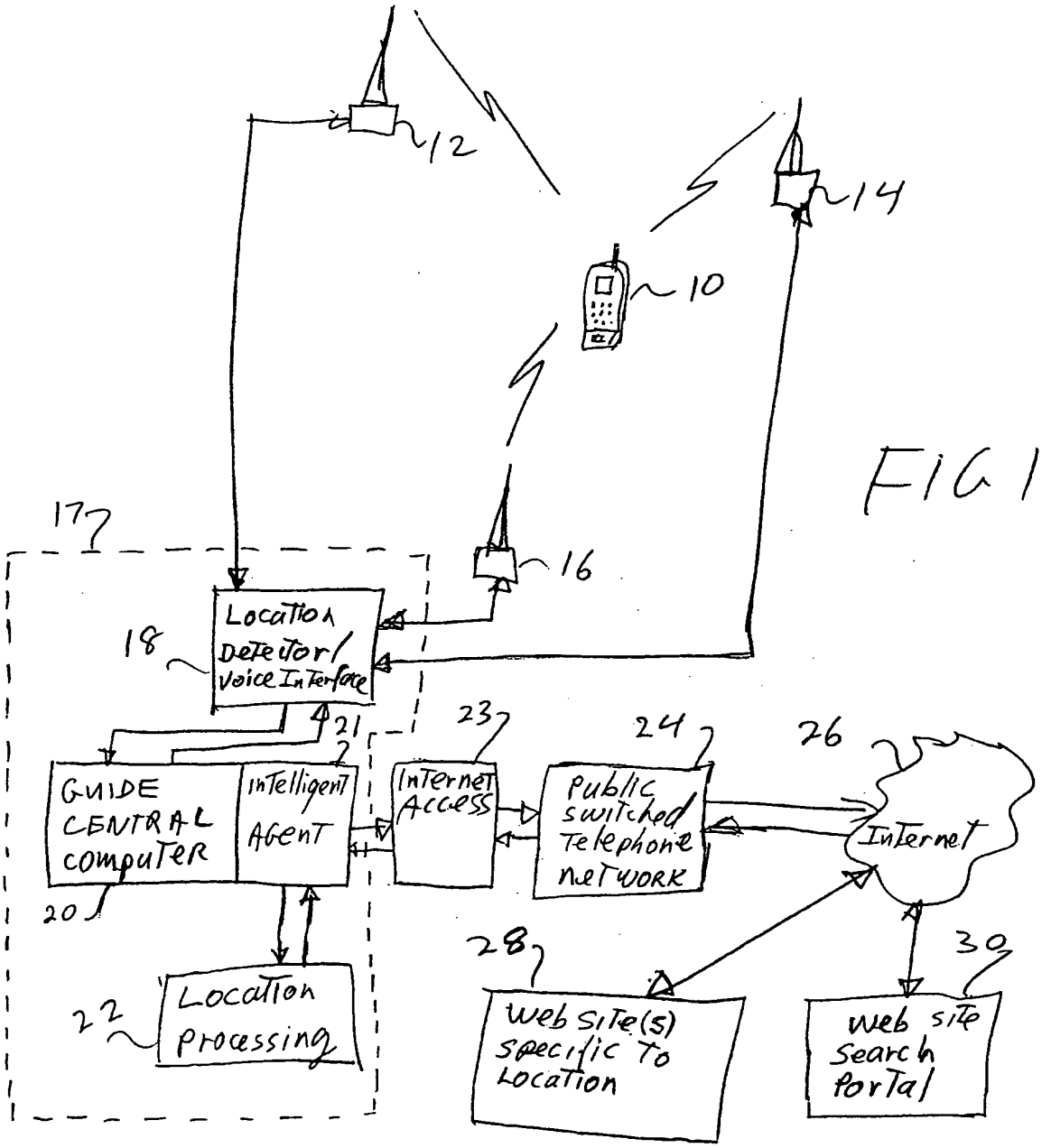
32. A system method in accordance with claim 20, wherein said request for a guided tour is an oral request.

33. A system method in accordance with claim 20, wherein said description of said given exhibit to said user is an aural description of said given exhibit.

34. A system method in accordance with claim 20, wherein said directions to said user to enable said user to travel to said given exhibit of said plurality of exhibits are aural directions.

35. A system method in accordance with claim 20, wherein said description of said given exhibit to said user is received over a wireless communication link.

36. A system method in accordance with claim 20, wherein said user makes requests related to said guided tour over a wireless communication link.


12
14
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18
Location Detector/ Voice Interface
21
23
24
26
GUIDE CENTRAL COMPUTER
Intelligent Agent
Internet Access
Public switched Telephone network
Internet
20
22
Location Processing
28
Web site(s) specific To Location
30
Web site Search Portal

FIG 1

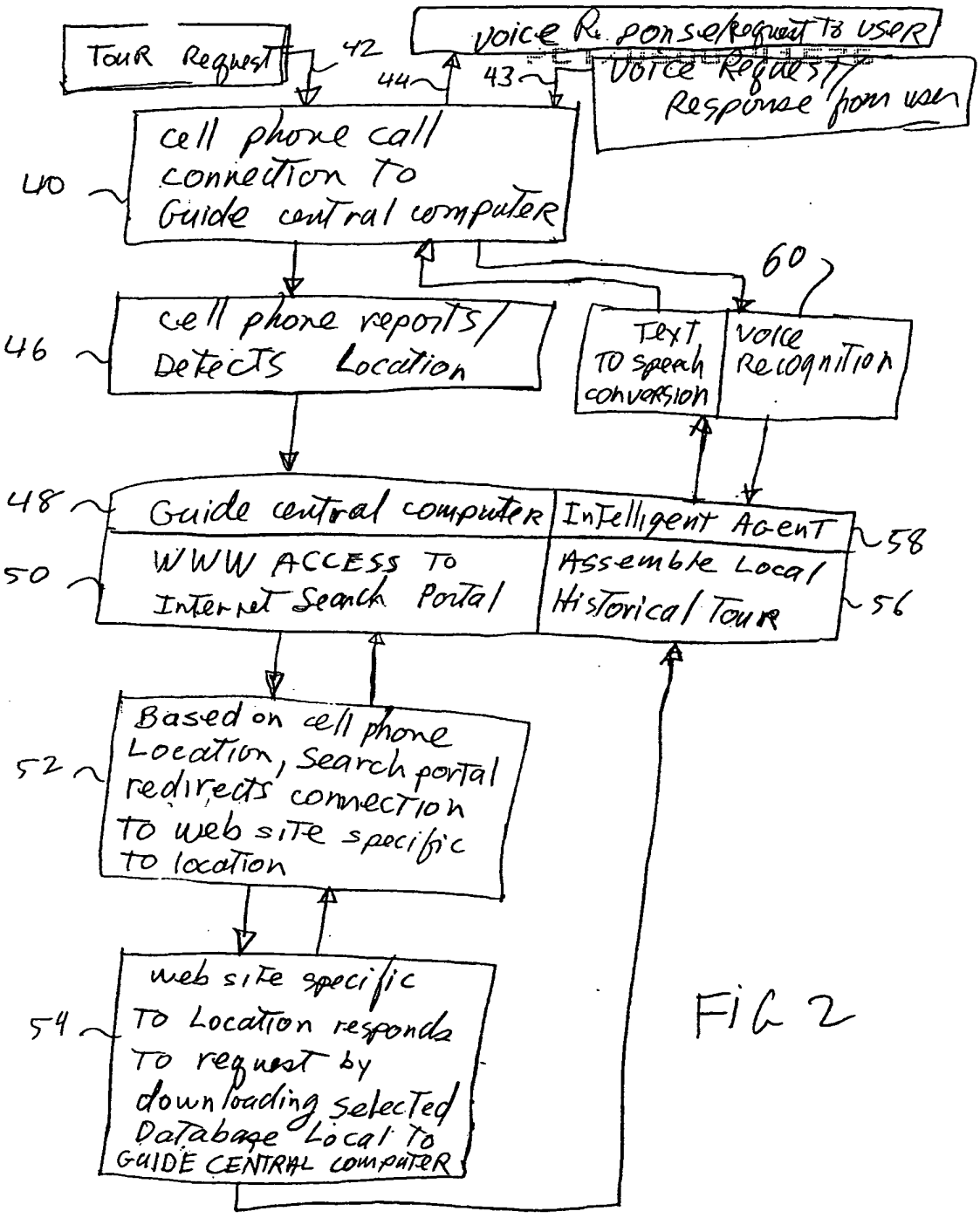
Tour Request
42
Voice Response/request to user
44
43
Voice Request/ Response from user
40
cell phone call connection to Guide central computer
60
46
cell phone reports/ Detects Location
Text to speech conversion
Voice Recognition
48
Guide central computer
Intelligent Agent
58
50
WWW ACCESS TO Internet Search Portal
Assemble Local/ Historical/ Tour
56
52
Based on cell phone Location, Search portal redirects connection to web site specific to location
54
web site specific To Location responds To request by downloading selected Database Local to GUIDE CENTRAL computer

FIG 2

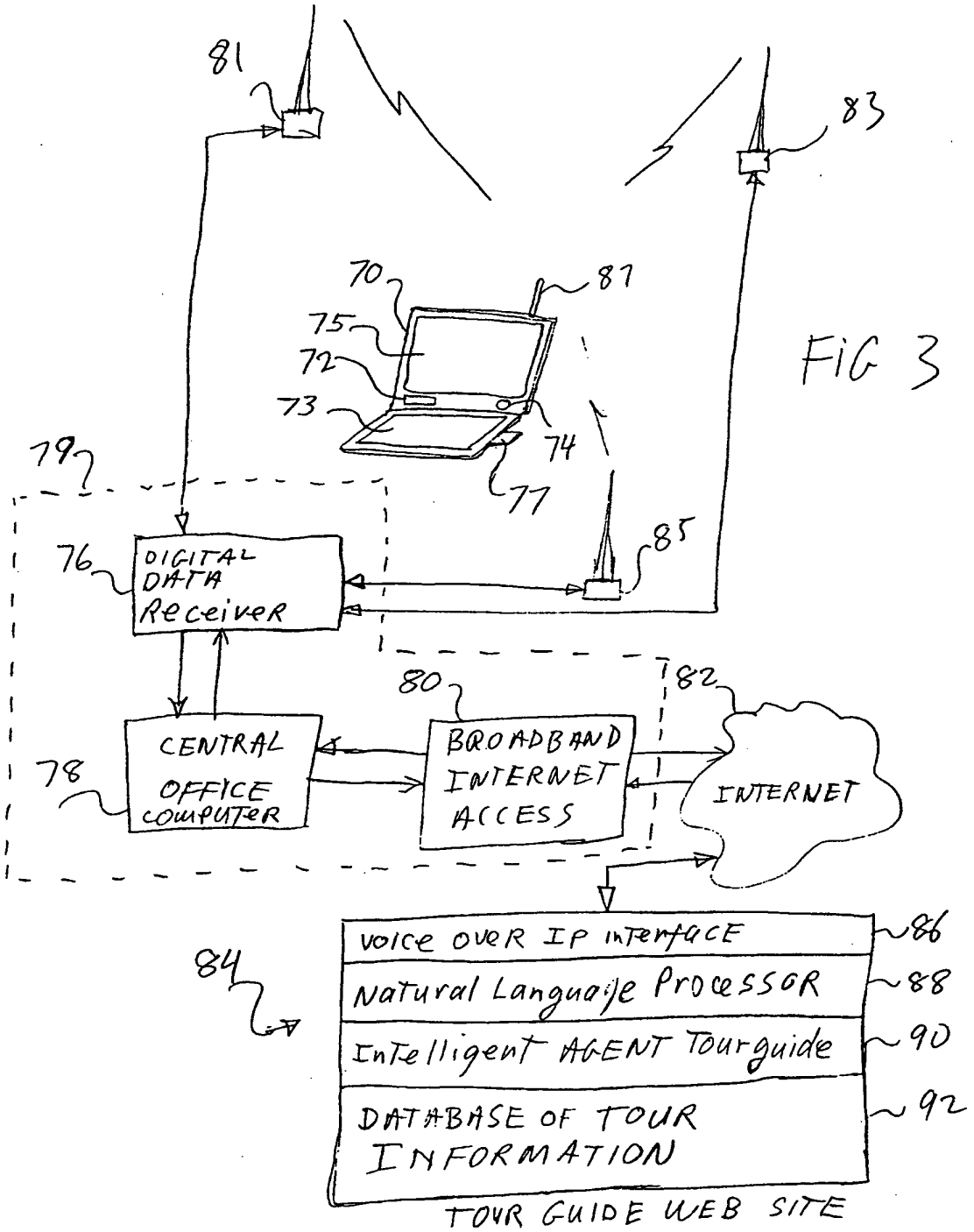
81
83
70
87
75
72
73
74
77
79
76
DIGITAL DATA Receiver
85
80
82
CENTRAL OFFICE COMPUTER
78
BROADBAND INTERNET ACCESS
INTERNET
84
VOICE OVER IP INTERFACE
86
NATURAL LANGUAGE PROCESSOR
88
INTELLIGENT AGENT TOURGUIDE
90
DATABASE OF TOUR INFORMATION
92
TOUR GUIDE WEB SITE

FIG 3

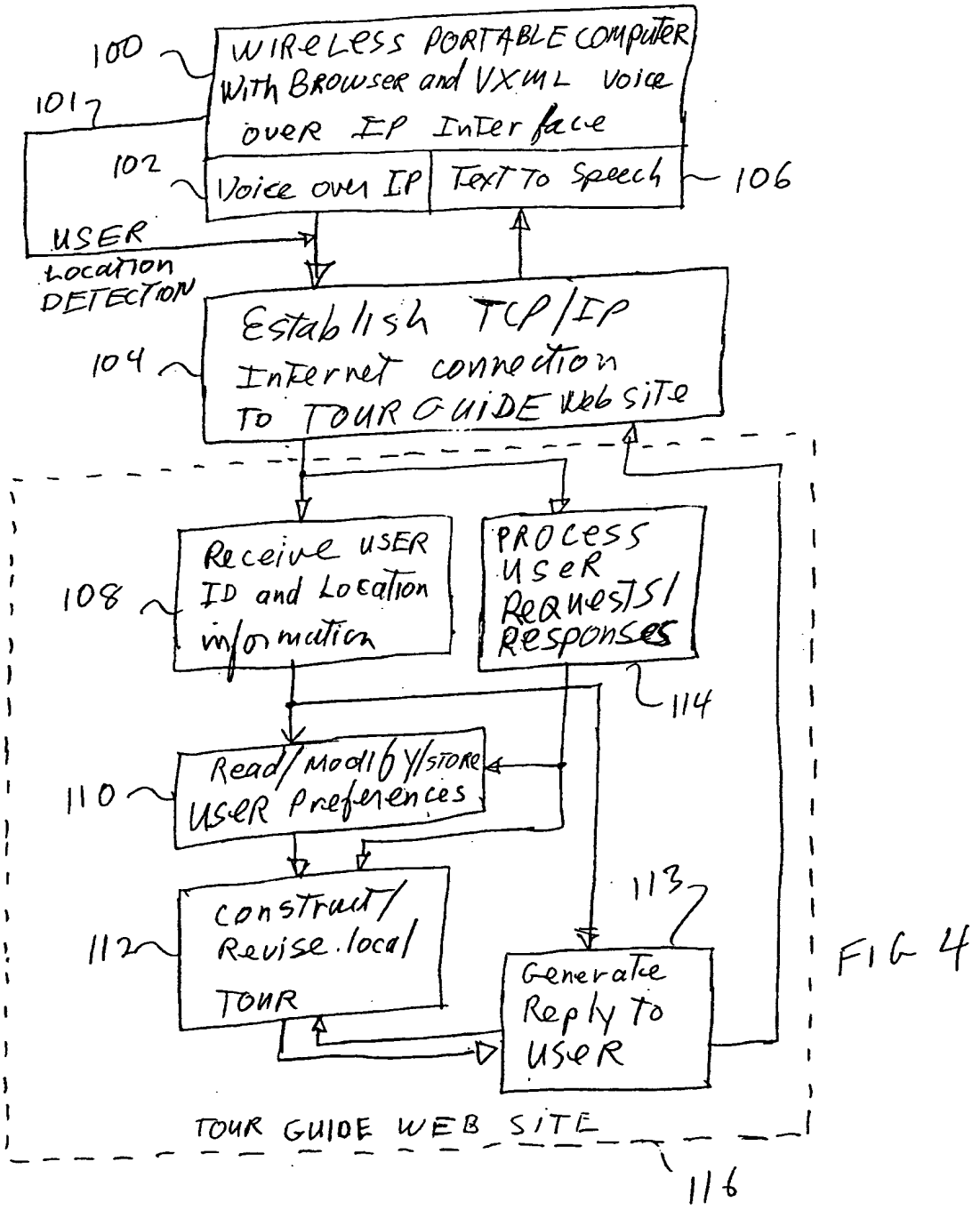
100
WIRELESS PORTABLE COMPUTER With BROWSER and VXML Voice over IP Interface
101
102
Voice over IP
Text To Speech
106
USER Location DETECTION
104
Establish TCP/IP Internet connection To TOUR GUIDE Web site
108
Receive USER ID and Location information
PROCESS USER REQUESTS/ RESPONSES
114
110
Read/Modify/STORE USER Preferences
112
Construct/ Revise local TOUR
113
Generate Reply to USER
TOUR GUIDE WEB SITE
116

FIG 4

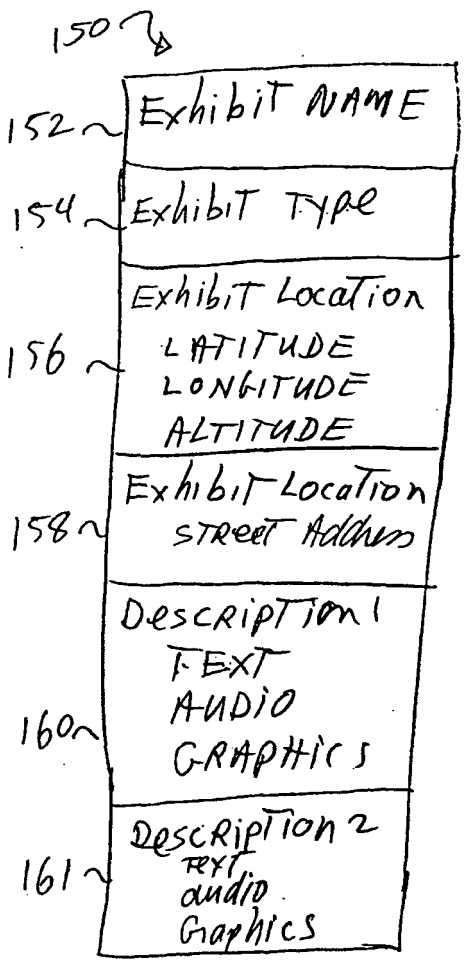
150
152
Exhibit NAME
154
Exhibit Type
Exhibit Location
156
LATITUDE
LONGITUDE
ALTITUDE
Exhibit Location
158
Street Address
Description 1
TEXT
AUDIO
GRAPHICS
160
Description 2
161
TEXT
audio
Graphics

Fig 5A

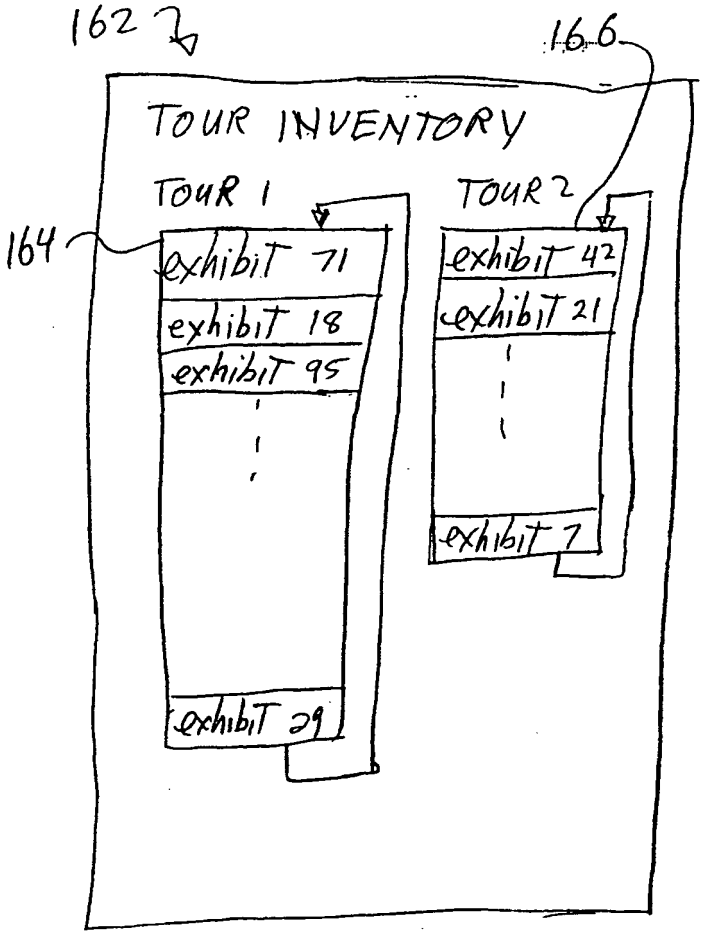
162
166
TOUR INVENTORY
TOUR 1
TOUR 2
164
exhibit 71
exhibit 18
exhibit 95
exhibit 29
exhibit 42
exhibit 21
exhibit 7

Fig 5B

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(74) Agent: JACOBSON, Allan, J.: Intellectual Property Law, 13310 Summit Square Center, Route 413 & Doublewoods Road, Langhorne, PA 19047 (US).

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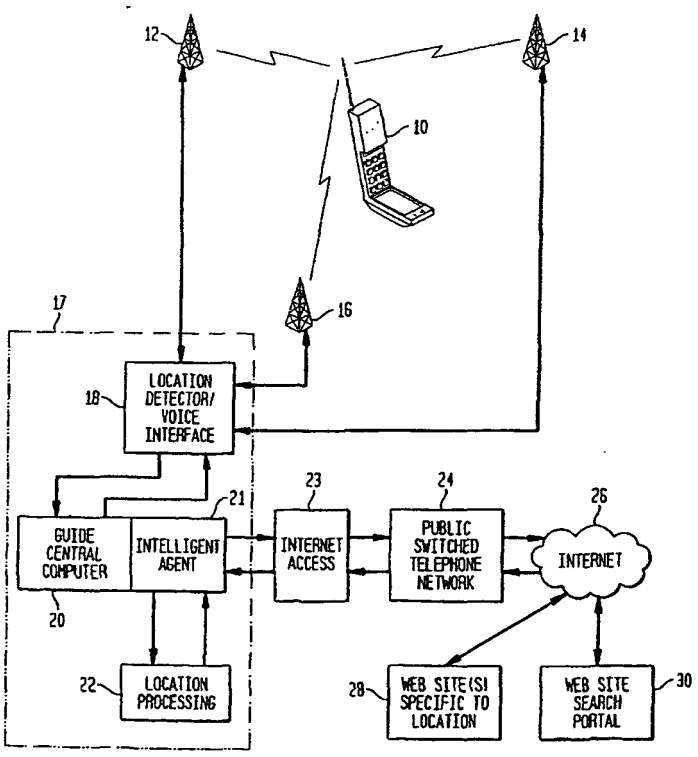
10 May 2002

[Continued on next page]

(54) Title: METHOD AND APPARATUS FOR WEB ENABLED WIRELESS TOUR-GUIDE SYSTEM



(57) Abstract: A web enabled wireless personalized and customized virtual tour-guide system includes a wireless tour-guide device and system enabled to access the Internet. The geographic location of the wireless tour-guide device is detected and reported. Intelligent agent software is responsive to a request from the user to create a customized tour program using information accessed at selected Internet web sites or a web site with pre-aggregated information. The intelligent agent uses the created tour program, such as a tour of historical exhibits, to guide the user along the customized tour route by voice and/or graphics, and provides information about each exhibit on the tour. The virtual tour-guide system can personalize each directed tour by taking individual user expressed preferences into account, and can use collaborative filtering of experiences with prior users to suggest other exhibits which may be of interest to the present user. The web enabled wireless tour-guide system is goal directed and interactive, responding like a human tour-guide to the needs of the user.

WO 01/35600 A3

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

INTERNATIONAL SEARCH REPORT

Inter onal Application No
PCT/US 00/41576

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 H04L29/08 H04L12/28

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 H04Q G01S

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal, WPI Data, INSPEC

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 98 08314 A (GINIGER MICHAEL L ;HILTON WARREN SCOTT (US)) 26 February 1998 (1998-02-26)	1,6,8
Y		7
A	figure 1 page 1, line 1 -page 8, line 25 page 14, line 30 -page 41, line 13	2-5,9, 15,20
Y	EP 0 697 670 A (AT & T CORP) 21 February 1996 (1996-02-21)	7
A	column 4, line 20 - line 32 column 6, line 12 - line 39	1,9,15, 20

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[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
9 October 2001	19/10/2001

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Scalia, A

Form PCT/ISA/210 (second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

Inter ·ional Application No
PC1/US 00/41576

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication,where appropriate, of the relevant passages	Relevant to claim No.
P,X	US 6 023 241 A (CLAPPER EDWARD O) 8 February 2000 (2000-02-08)	15,20, 26,35,36
P,A	figure 2 column 2, line 1 -column 7, line 44	1,9, 16-19, 21-25, 27-34

1

INTERNATIONAL SEARCH REPORT

.formation on patent family members

Inter tional Application No
PC1/US 00/41576

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			WO	9808314 A1	26-02-1998
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US 6023241	A	08-02-2000	NONE		